Claims (1/5)

1. An imaging device comprising:

a) a means for illuminating at least one illumination point on an observed zone of an observed plane by means of an illumination light beam,

b) a means for selecting, in the light coming from the observed plane, the light coming from said illumination point,

c) a means for forming an image of said illumination point from the selected light coming from said illumination point,

d) a scanning system for displacing said illumination point on the observed zone and for simultaneously displacing the image of said illumination point, in order to scan an observed zone and form a first image of the observed zone,

e) a sensor which detects the first image,

characterized in that:

f) it comprises a means for selecting, in the light coming from the observed plane, the light coming from a band surrounding said illumination point,

g) it comprises a means for forming an image of said band from the selected light coming from said band,

h) the scanning system is arranged so as to simultaneously displace said illumination point and the image of said band, in order to form a second image of the observed zone from the selected light coming from said band,

i) it comprises a sensor which detects the second image,

j) it comprises a means for combining the first and second images of the observed zone to form a third image of the observed zone.

2. The device as claimed in claim 1, characterized in that said means for combining said first and second images determine the difference between the first image modified by a first multiplier coefficient and the second image modified by a second multiplier coefficient.

3. The device as claimed in one of claims 1 to 2, characterized in that said bands are rings that are concentric to said illumination points.

4. The device as claimed in one of claims 1 or 2, characterized in that it comprises a plurality of illumination points and a plurality of bands, each of said bands surrounding a corresponding illumination point.

5. The device as claimed in claim 4, characterized in that the means for illuminating the plurality of illumination points comprise an array of microlenses which separate a laser beam into a plurality of subbeams, each focused on one illumination point.

6. The device as claimed in one of claims 1 to 3, characterized in that it comprises a single illumination point, and in that the means for illuminating the illumination point comprises a lens which focuses a laser beam on the illumination point.

7. The device as claimed in one of claims 1 to 6, characterized in that the means for selecting the light consist of the superposition of a first opaque plate comprising at least one transparent disk and of a second opaque plate comprising at least one transparent disk and at least one transparent ring, as well as a means for moving the second plate in translation with respect to the first, so as to bring the disk of the second plate opposite the disk of the first plate during acquisition of the first image and so as to then bring the ring of the second plate opposite the disk of the first plate during acquisition of the second image.

8. The device as claimed in one of claims 1 to 7, characterized in that:
- the means for selecting the light comprise a mask composed of transparent or reflective microprisms which make it possible to send in a first direction the light coming from the illumination points and constituting a first beam and to send in a second direction the light coming from the set of bands and constituting a second beam,
- the device comprises a means for forming the first image from the first beam,
- the device comprises a means for forming the second image from the second beam.

9. The device as claimed in claim 8, characterized in that it comprises:
- an intermediate lens for sending the first and the second beam into a separation zone where they are spatially separated,
- at least one prism or one mirror which is placed in the separation zone, in order to modify the direction of at least one of the first and second beams.

10. The device as claimed in claim 9, characterized in that it comprises a lens which is simultaneously passed through by the first and the second beam after the separation zone, and which forms the first and the second image in two distinct zones of the same image plane.

11. The device as claimed in one of claims 8 to 9, characterized in that:
- it comprises a first aperture diaphragm which is passed through by the illumination light beam before it reaches the mask composed of transparent or reflective microprisms,

- it comprises a second aperture diaphragm which is passed through by the illumination light beam coming from the mask and directed toward the observed object,
- the first aperture diaphragm is positioned such that the part of the illumination beam which reaches a zone of the mask which transmits said second beam is then stopped by the second aperture diaphragm, and such that the part of the illumination beam which reaches a zone of the mask which transmits said first beam then passes through the second aperture diaphragm.

12. The device as claimed in one of claims 1 to 11, characterized in that the selection means are fixed masks and in that the scanning system consists of a moveable mirror.

13. An optical microscopy system comprising:
- a means for illuminating an illumination zone in an observed plane of an observed object and for displacing the illumination zone in the observed plane, in order to scan an observed zone,
- a mask which divides the light coming from the observed plane into a first beam coming from the illumination zone and a second beam coming from a secondary detection zone,
- a means for forming a first image from the first beam,
- a means for forming a second image from the second beam,
- a means for combining the first and the second image to form a third image,

characterized in that said mask is composed of transmissive or reflective microprisms which make it possible to send in a first direction the light coming from the illumination zone and constituting a first beam and to send in a second direction the light coming from the secondary detection zone and constituting a second beam.

14. The device as claimed in claim 13, characterized in that it comprises:
- an intermediate lens for sending the first and the second beam into a separation zone where they are spatially separated,
- at least one prism or one mirror which is placed in the separation zone, in order to modify the direction of at least one of the first and second beams.

15. The device as claimed in claim 14, characterized in that it comprises a lens which is simultaneously passed through by the first and the second beam after the separation zone, and which forms the first and the second image in two distinct zones of the same image plane.

16. The device as claimed in one of claims 13 to 15, characterized in that:
- it comprises a first aperture diaphragm which is passed through by the illumination light beam before it reaches the mask composed of transparent or reflective microprisms,
- it comprises a second aperture diaphragm which is passed through by the illumination light beam coming from the mask and directed toward the observed object,

- the first aperture diaphragm is positioned such that the part of the illumination beam which reaches a zone of the mask which transmits said second beam is then stopped by the second aperture diaphragm, and such that the part of the illumination beam which reaches a zone of the mask which transmits said first beam then passes through the second aperture diaphragm

17. The device as claimed in one of claims 13 to 16, characterized in that the illumination zone consists of a set of parallel bands, and in that the secondary detection zone consists of a set of bands alternating with the bands of the illumination zone.

18. The device as claimed in one of claims 13 to 17, characterized in that the illumination zone consists of a set of points, and in that the secondary detection zone consists of a set of bands surrounding each of the points of the illumination zone.

19. The device as claimed in claim 18, characterized in that the secondary detection zone consists of a set of rings surrounding each of the points of the illumination zone.

20. An optical microscopy system comprising:

a) a means for illuminating an illumination zone on the observed object, by means of an illumination beam,

b) a means for selecting the light coming from a detection zone and constituting a beam to be detected,

c) a means for forming in an image plane an image of the observed object from the beam to be detected,

d) a scanning device for displacing the illumination zone in order to scan the whole of the observed zone and in order to simultaneously displace the image of the illumination zone in the image plane,

e) a sensor arranged in the image plane, for successively detecting a first image of the observed object and then a second image of the observed object,

f) a means for combining the first and the second image in order to obtain an improved image,

characterized in that:

- it comprises a mask arranged on the path of the beam to be detected or on the path of the illumination beam, delimiting the illumination zone or the detection zone and reached by just one of either the beam to be detected or the illumination beam,
- it comprises a means for modifying the features of this mask between the acquisition of the first image and the acquisition of the second image, so as to modify the detection zone while leaving the illumination zone unchanged or so as to modify the illumination zone while leaving the detection zone unchanged.

21. The imaging device as claimed in claim 20, in which the mask comprises an alternating arrangement of bands, and in which the modifying means is a means for displacing the mask in a direction that is not parallel to said bands.

22. The imaging device as claimed in claim 20, in which the mask consists of the superposition of a first array of disks and of a second array comprising disks and rings, and in which the means for modifying the features of the mask consist of a means for moving the second array in translation with respect to the first array, so that the disks of the first array alternately select the rings or the disks of the second array.